mately 300 cm$^3$), with a ratio between measuring area and volume of approximately 0.21.

The above-mentioned miniaturization also allows a containment of the weight, which is advantageously less than 1.5 Kg.

Advantageously, the dimensions and the volume are independent of the number of pixels (crystals of the scintillation matrix) used, since, unlike prior art semiconductor solutions, the architecture of the gamma camera **1** according to this invention uses an electronics which does not require upgrading if the number of pixels is to be increased (for example, reducing the dimensions to increase the resolution).

More specifically, the electronic controller unit **6** uses an analogue/digital conversion system for sampling the signals which always uses four channels irrespective of the number of pixels used.

It is evident that this allows, therefore, an increase in the spatial resolution without penalising the size and ease of handling.

According to an advantageous aspect of the invention, the display **5** has a measuring area with dimensions coinciding with the measuring area of the scintillation structure **3**, that is to say, with a 1:1 ratio.

Preferably, the measuring area of the display **5** has sides with different lengths and preferably with a ratio of 16:9 or 4:3.

The possibility of displaying the image with a 1:1 ratio between the area of the display **5** and the measuring area assumes an importance linked to a better identification and understanding of the diseases which can be directly observed during acquisition and without any scale reduction factor.

FIGS. **4** and **5** show two situations for diagnostic use of the gamma camera **1** wherein the heart and the thyroid of a patient are analysed, respectively.

Moreover, the use of representative solutions with 16:9 or 4:3 ratio between the sides of the detector allow a specific design optimisation linked to the use of standard and widespread components (LCD screens or the like) for the analysis of organs which, normally, have an elongate shape or which enter better in the field of view of a detector with these dimensional proportions. If, for example, a 16:9 ratio is used with the dimension of the long side being 40 cm, the short side of the area of the detector would be 22 cm. With a detector of this type, it is possible to investigate the majority of organs and make the apparatus less bulky since, for the same diagnostic investigation, a detector with square dimensions would have a large portion of the measuring area unused. If, for example, the kidney, of elongate shape, is taken into consideration, it is possible to perform the scintigraphic analysis adapting the longest side of the detector in the direction of the longest axis of the organ, establishing in this way a use in contact with the patient having a smaller overall size of the entire apparatus. In general, all the organs have an ellipsoid shape (brain, kidney, heart, thyroid, etc.), therefore having two axes of different length.

The invention achieves the aims set by overcoming the above-mentioned disadvantages of the prior art.

More specifically, the adoption of a scintillation measuring system allows the adoption of a low absorption electronic controller unit and distinctly miniaturizable which can be inserted in a single container without using cables connecting with external output apparatuses, but, on the contrary, fitting the entire operating unit in a single machine body, equipped with a display positioned behind the detector, so as to guarantee a correct display of the information produced.

The electronic controller unit used is also able to always use, in association with the resistive network used, four signal sampling channels irrespective of the number of pixels used, and this makes it possible to increase the spatial resolution without penalising the dimensions and the ease of handling.

Moreover, the absorption of the calculation systems can be reduced by using suitable processing systems with reduced calculation output thanks to the particular operational logic of the electronic controller unit used which does not require a significant increase in the calculation output with the increase of the desired spatial resolution or the measuring area.

The resulting structure of the gamma camera according to this invention is therefore compact and easy to handle.

More specifically, the compactness requirement is satisfied by the ratio between the measuring area and volume of the containment body, greater than 0.10 and up to 0.50 and above. The easy to handle requirement is, on the other hand, satisfied by the small dimensions and by the low weight, which make the gamma camera easy to manoeuvre manually by the operator without the need for auxiliary supports and without exercising particular physical efforts.

This makes the gamma camera according to this invention suitable for the localisation of diseases in operating rooms and for the diagnostic investigation of small organs, as well as the scintigraphic analysis of organs of small animals, so as to trial new radio-marked antibodies, which are specific for certain diseases. Moreover, its application can be planned in safety sectors (airports) or for industrial diagnostics. The main use of the gamma camera relates to the localisation of tumoral lesions, especially in those techniques which require an adequate spatial precision such as biopsies (prostate and breast) or in radioguided or radioimmunoguided surgical operations or as a monitoring system in radiometabolic therapy, radioguided surgery and radiant therapy techniques.

This gamma camera can be effectively applied in many diagnostic techniques where the fast display of the diagnostic details and their relative position relative to the image produced provides the user with an array of information useful in the continuation of the clinical procedures. For example, the localisation of thyroid nodules, diseases linked to bone inflammations (diabetic feet) and sentinel lymph nodes are all techniques which can be quickly localised with a device positioned directly on the cutis of the patient.

The invention claimed is:

**1**. A portable gamma camera, comprising:

a containment body;

- a measuring structure housed inside the containment body and designed to receive radiation;
- a collimator made of a material with a high atomic number, associated with the measuring structure for absorbing a lateral radiation directed towards the measuring structure and having an angle of incidence greater than a predetermined value;
- a display, positioned on the containment body;
- an electronic controller unit, operating between the measuring structure and the display for generating on the display images representing the radiation intercepted by the measuring structure;

wherein the measuring structure comprises a scintillation structure,

wherein the electronic controller unit comprises at least one optoelectronic converter selected from the group comprising APD, SiPM and/or MPP,

wherein the electronic controller unit also comprises:

- an electronic system designed for reading, amplifying and integrating output signals from the optoelectronic converters;